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AUTHOR Laasonen, Raimo J.
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ABSTRACT

The objective of this study was to inquire if tunneling of mind, motivation to novelties, and creative mindies in 4 age groups (13, 14, 15, and 16, years of age) have dynamic relationships. A creative mindy is a new organized mind shape not previously occurring. The subjects were 93 pupils of a secondary comprehensive school. Questionnaires were constructed to measure tunneling and motivation to novelties. A creative mindy test was developed. A coefficient for reliability was developed through the coefficients of determination and nondetermination. Validity was examined calculating scalar products of the items between the age groups divided by the maximum scalar product. The reliability coefficients proved to be rather satisfactory (the mode was 0.80). The validity coefficients were satisfactory (the modes were 0.90). The item scores because of high correlations were added to a sum score and a usual statistical classification procedure was applied to the quantification of the variables. Matrix products were used to break the symmetries between the variables. The hypothesis was not supported. The results indicate that no sole variable exists. The variables acted as a dependent variable in turn and formed eccentric feedback loops in moving from mutual stabilization to oscillation. Age differences in tunneling thinking are discussed, and implications for teaching are reviewed. (Contains five tables and seven references.) (Author/SLD)

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ED 418 133

An Educational Way of Dealing with Tunneling, Motivation to Novelties, and Creative Mindies in 13-16 Years of Age

Raimo J Laasonen
Project researcher
Vihti, Finland

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Raimo Laasonen

Running head: AN EDUCATIONAL WAY OF DEALING

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Abstract

The objective of the study was to inquire if tunneling of mind, motivation to novelties, and creative mindies in four age groups (13,14,15,16 years of aged) have dynamic relationships. The subjects were pupils of a secondary comprehensive school. Questionnaires were constructed for the tunneling and motivation to novelties. A creative mindy test was developed. A coefficient for reliability was developed through the coefficients of determination and nondetermination. Validity was examined calculating scalar products of the items between the age groups divided by the maximum scalar product. The reliability coefficients proved to be rather satisfactory (the mode was 0.80). The validity coefficients were satisfactory (the mode was 0.90). The item scores because of high correlations were added to a sum score and a usual statistical classification procedure was applied to the quantification of the variables. Matrix products were used to break the symmetries between the variables. The hypothesis falsified. The results indicate that no sole dependent variable exists. The variables acted as a dependent one in turn and formed eccentric feedback loops in moving from mutual stabilization to oscillation.

An Educational Way of Dealing with Tunneling, Motivation to Novelties, and Creative Mindies in 13-16 Years of Age

The study is a ramification of my thesis results and its motivation grows from the functional relations found in the information organizer of an individual (Laasonen, 1991, p. 83). The totality of the functions, indirectly, refers to that there may be tunneling of mind based on dogmatic and tolerant aspects. On the other hand, when environment becomes more turbulent and complex, creative solutions are necessary for solving confronting problems.

Thus motivation to novelties and creative mindies become essential for problem solving. However, the tunneling of mind is an obstacle for coping with new situations because it does not allow open scan of environment. As for the concept of a mindy, it means an organized mind shape with elastic and plastic characteristics (Laasonen, 1993, unpublished). A creative mindy accordingly is a new organized mind shape not previously occurred. In this context, motivation to novelties means urges to have new experiences and solutions. The tunneling can

be defined as an entity of dogmatism and tolerance or as uncritical acceptance of beliefs from an authority and patience with beliefs of social environment.

Educationally, the above variables are precarious because novelties mean unpredictable events and creative mindies means surprises. So it is preferable to educate dogmatically tolerant persons as it takes place in institutional education where immediate subordination prevails as a technique of control.

The question is about transfer of already existing modes of behavior because it is safe, predictable, and controllable. However, if the aim is to educate cultured persons who are able to solve problems and not to repeat the made errors then spontaneous individual solutions are to be rewarded. The educational environment of a child stresses the believing in what is said, not finding personal solutions in relations to environment. It is fertile soil for the emergence of tunneling where dogmatic and intolerant aspects dictate the relations with authorities and democratic control upwards does not function. From the viewpoint of power use it is profitable to the authorities to educate tunneled persons

because tunneled persons are dependent on the beliefs of the authorities. Persons who are not blind to the authorities are difficult to persuade to believe the justification of decisions. Thus in spite of the risks included in democratic value system from the viewpoint of power it is useful to educate alert persons who are able to monitor the ones who deal with things of persons.

Third, the age phase from 13 to 16 includes rapid development where mental events are not yet solidified and instructional possibilities exist for education of openly scanning persons. That is why it is necessary to inquire the dynamics between tunneling, motivation to novelties and creative mindies because it is possible to prevent the emergence of tunneling, to reinforce motivation to novelties, and encourage personally inventive solutions to problems in transforming environment, in some quantity. The crucial question is teacher education but the matter does not include in the scope of the study. Theoretically, the study associates with the continuum from Adorno,Frencel-Brunswik,Levinson, and Sanford (1950) and Allport (1954) and to Rokeach (1960,1970) and Kirscht and Dillehay (1967), to

mention some of the authors of the subject matter. Zooming at the variable relations theoretically produces an inference concerning the tunneling. Increase of dogmatism and decrease of tolerance indicate strong tunneling. Inversely, the tunneling weakens. In the first case, adherence of one's own dogma makes the scan of others narrower and less patient. In the second case, the environment is scanned more openly and patiently that means better understanding.

As for the entire problem, it can be assumed motivation to novelties decreases the tunneling that increases creative mindies during the four year time interval. The reasons for the hypothesis are (a) when a young person wants to experience new things then security factors are not so central as usually. Thus there is no need for tunneling of mind (b) when tunneling is weak the desires to experiment with new solutions to problems emerge without the constraints included in the tunneling. On the measure level, the hypothesis means the scores of motivation to novelties associate with the scores of the tunneling, inversely and inversely, the scores of the tunneling associate with creative mindies.

In this context, the dogmatism and tolerance,

the subvariables were picked up from the theoretical results of Rokeach (1970) and Allport (1954). Dogmatism included items of undifferentiation of disbeliefs, pessimism, power, and intolerance of disagreement. Tolerance had the items of security, fighting, liberalism, empathy, self-insight, personal autonomy, circle restriction, self-thrust, reassurance, and threat. Motivation of novelties had the items: desire to novelties, curiosity to novelties, and future orientation to novelties. Creative mindies included a drawing task with six figures having initial points of a cumulative order of complexity. The number of points increased in a series 1,3,6,10,15,21 in a random placement in the frames.

Method

Subjects

The subjects were pupils from a secondary comprehensive school in the grades of seven, eight, and nine in the same school district. The total number of subjects was 93.

Materials

I constructed a measure device with three parts because ready made ones were not available. The first part included the items of dogmatism and cf tolerance

with a rating scale of five points. The response heads were to measure how near or far the subjects experienced the variables to be with themselves. The motivation to novelties measure included three items with the Likertian type of scale, one item for each variable. The measure of the dependent variable, creative mindies had six figure frames for free drawing. The points in the frames were randomly scattered. The points formed an increasing order of complexity through 1, 3, 6, 10, 15, 21.

The drawings had to be named on the line above the frames. The quantification of the motivation to novelties, dogmatism, and tolerance measures formed no difficulties because the scoring was direct. The creative mindies measure was somewhat problematic because of freedom of drawing. However, the drawings scored in a cumulative manner. The goal of a drawing equalized with the name of the figure. A figure scored zero (a) when all the points were not used and no name (goal) was given to the drawing. The drawing scored one (b) when there was no goal but all the points were used. A score two was given to the drawing (c) when all the points were used and the figure included a name. A figure was scored as three (d) when all the

points were used, and a goal existed, and the figure was deviant from the customary one, for example a dog or an airplane. The scoring based on my experience to analyze drawings in some other studies.

Procedure

The testing took place during lessons. Time elapsed about half an hour to answer the items. Nothing special occurred during the testing situation and the situations went fluently. The dogmatism and tolerance answering were instructed: There is a set of sentences in the questionnaire with a rating scale after them. Your task is to show the evaluation of your own by circling only one number on the scale according to how near or far you experience the matter in the sentence. The answering of the motivation to novelties was instructed: The matters in the sentences are answered by circling only one cross from the response alternatives. The creative mindies were instructed: There is a set of initials of figures as points in the below task. Your task is to draw figures in the frames using all the points for drawing. You can draw whatever you want but give names to the figures.

The obtained data differentiated between four groups according to age. The first group was 13

years old (n=22), the second 14 years (n=40), the third group included 15 years (n=22), and the last one 16 years of age (n=9). The measures were not used previously and that is why it was necessary to assess reliability and validity.

Evaluation of Reliability

The usual quantification of the items was applied. The item values of the data matrices were normalized and scalar products were calculated between the item vectors. The consequence of managing like this was cosine matrices. Usually, the calculation of reliability is rather tedious between many items. That is why I adopted a simpler way of examining the reliability. The coefficient of determination is r_{ij}^2 that means common variance between the items. The coefficient of nondetermination is k^2 that means the variance not connected with the items.

The construction of a simple reliability coefficient began by squaring the off-diagonal values of the cosine matrices. The squared values were added and it resulted in the total common variance between the items. The total nondetermination between the variables

was calculated subtracting the common variance cells from one. After it the cell values were squared and added together for obtaining of the total noncommon variance. Thereafter a simple formula was developed, $r^{ii} = 1 - (f/ß)$. The formula reads from left to right: Reliability is maximum possible reliability minus the quotient of the total nondetermination and the total determination. Thus $f = \sum\sum k_{ij}^2$ and $ß = \sum\sum r_{ij}^2$. The idea behind the formula is when the total common variance increases the reliability approaches its maximum value. If there is no noncommon variance then the reliability has its maximum and if no common variance exists then the reliability is indefinable.

Evaluation of Validity

In this context I preferred to choose a kind of predictive validity which meant the calculation of the scalar products of the cosine matrices between the age groups, in time order. The procedure gave an opportunity to see if the measures were age specific and if there was variability between the age groups. The high values would mean that the tests measure the same things and that they are not sensitive to age factors as well as the number of observations. The maximum

validity coefficient, of course, is the case when the cosines are ones, then the scalar products reach their greatest values. It is in rare cases when the maximas are reached.

So I decided to divide the scalar products with their maximum values. This resulted coefficients that told how much the values left behind the maximum possible values.

Statistical Analysis

The values of the cosine matrices of dogmatism, tolerance, motivation to novelties, and creative mindies warranted for construction of the sum scores. The sum scores were classified into three classes to show low, medium, and high quantity of the variables. The class marks were multiplied by the frequencies that resulted in three by four matrices where the columns included the age groups in increasing order and the rows comprised the three classes. The four matrices were column normalized.

Results

In this context I present the reliability and validity coefficients before dealing with the results because of proportional certainty of the inferences.

Reliability and Validity

The reliability coefficients can best be verified

in Table 1. The values are rounded mathematically.

Insert Table 1 about here

The values of Table 1 tell the measures are not sensitive to age influences and number of subjects. The latter thing bases on the fact that correlations often are the initial values for calculating reliabilities.

In the place of validity I have to change the way of presentation because the coefficients are the mode values of the off-diagonal, mathematically rounded item matrices between the age groups.

Insert Table 2 about here

The "predictive "coefficients are high which means the measures probably measure what they are to measure. In other words, the differences between the values are small. Thus the measures do not include much of specificity.

Relationships of Variables

The main result of the study indicates that the hypothesis falsifies and something else is obtained

Table 1

Reliabilities of Measures in Age Groups

Age	Measures			
	Dogmatism	Tolerance	Motivation to Creative Novelties	Mindies
13	.70	.80	.70	.80
14	.80	.80	.90	.90
15	.80	.90	.90	.80
16	.80	.70	1.00	.80

Table 2

Validities between Age Groups Based on Modes

Age Groups	Measures			
	Dogmatism	Tolerance	Motivation to Novelties	Creative Mindies
13-14	.90	.80	.90	.90
14-15	.90	.90	.90	.90
15-16	.90	.80	1.00	.90

than expected. In this context, it is not possible to pack full the results into a table but the examination demands a processual grip. In Table 3 the initial situation of analysis is as matrices.

Insert Table 3 about here

The matrices in Table 3 were multiplied with their transposes. This resulted in four by four symmetric matrices. The diagonals of the outcome matrices included machine rounding errors and that is why the diagonal values were replaced with ones. The square matrices were multiplied with each other, next. The dogmatism and tolerance matrices were multiplied first to obtain the tunneling matrix. There was no problem with the multiplication because pre-and post multiplication gave the same matrix. The same thing concerned the outcome matrix of motivation to novelties and creative mindies. The problematic case was the pre-and post multiplication of the tunneling matrix with the square matrices because the result was not the same matrix. The greatest values submitted under keener examination in

Table 3

Matrices of Dogmatism, Tolerance, Motivation to Novelties, and Creative Mindies

	Dogmatism				Tolerance			
	Age				Age			
Quantity	13	14	15	16	13	14	15	16
Low	.29	.31	.76	.12	.53	.63	.37	.49
Medium	.79	.80	.61	.91	.55	.73	.81	.75
High	.53	.49	.18	.38	.63	.25	.43	.41

	Motivation to Novelties				Creative Mindies			
	Age				Age			
Quantity	13	14	15	16	13	14	15	16
Low	.24	.09	.24	.38	.35	.01	.06	.11
Medium	.95	.52	.95	.15	.90	.17	.59	.91
High	.15	.84	.15	.91	.25	.98	.80	.37

the outcome matrices. The idea was to look for releasing of symmetric relationships included in the outcome matrices in time order because where the symmetries are broken there are influences.

The tridiagonal values of the outcome matrices were examined in the columns and rows comparing the values in time order. The multiplication directions were clear and there was no obstacle to construct triangles of relationships between the variables by starting from the relationship between dogmatism and tolerance. The outcome matrices were scaled to guarantee the comparability of the results.

Insert Table 4 about here

Table 4

Scaled Relation Matrices of Variables

		Tolerance						Tunneling				
Age		13	14	15	16		Age	13	14	15	16	
	13	.96	.97	.98	.99			13	.91	.92	.92	.93
Dogmatism	14	.97	.98	.98	1.00		Motiv	14	.97	.98	.98	1.0
	15	.85	.86	.87	.88		to Nov	15	.91	.92	.92	.93
	16	.93	.94	.95	.96			16	.91	.96	.91	.80
		Tunneling						Creat Mindies				
Age			13	14	15	16			13	14	15	16
	13		.87	.88	.88	.89		13	.86	.76	.95	.90
Creative	14		.78	.79	.79	.80	Motiv	14	.86	.83	1.0	.92
Mindies	15		.97	.98	.98	1.00	to Nov	15	.85	.77	.95	.90
	16		.92	.93	.94	.95		16	.71	.68	.82	.77

As one can verify from Table 4 there are no inverse relations which speak for the falsification of the hypothesis. It is somewhat problematic to define criteria for the change of the coefficients to study the dynamics in time order 13, 13-14,14, 14-15, 15, 15-16, and 16 years. The total context of the results refers that about 0.10 is a rather good approximation for changes in the matrices in Table 4.

The comparison of the values in the tridiagonals, sequentially in time order, shows the changes when the examination starts from the cell a_{11}. Combining the effects of the variables makes it possible to examine the changes of the relationships during the dynamics.

Insert Table 5 about here

Table 5

Changes of Relationships of Variables in Time Order

Relationship	Age						
	13	13-14	14	14-15	15	15-16	16
Dogmatism, Tolerance	m	m	m	m	d	d	m
Tolerance, Dogmatism	m	m	m	d	d	m	m
Tunneling, Mot to Nov	m	m	m	d	d		
Mot to Nov, Tunneling				m	d	d	d
Mot to Nov, Creat Min	m	d	m	m	m	m	d
Creat Min, Mot to Nov	m	m	m	d	m	w	w
Tunneling, Creat Min	m		m	i			
Creat Min, Tunneling		m			m	m	m

Note. m = maintain relationship; d = decrease relationship; i = increase relationship

Table 5 indicates the question is about the changes in the stable and stabilizing relationships between the variables. It means dynamism without oscillations and fluctuations in its initial state. That is a matter that is to be kept in mind when the conclusions are drawn.

Discussion

At first, the hypothesis falsifies because the original relationships between the variables are positive and the changes between the variables do not follow up the assumed order.

The second matter is there is no clear dependent variable but the variables function alone and in combination that verifies from the leaving relationships in the rows of Table 5.

In 13 years of age dogmatism and tolerance maintain mutual variation that implies tunneling. The tunneling maintains both the motivation to novelties and the production of creative mindies. The motivation to novelties maintains the production of creative mindies and vice versa. The variation in the entity of the variables takes place in the same pace.

In transition from 13 to 14 years the tunneling

continues but instead of the tunneling the crucial variable is the production of creative mindies that maintains both the tunneling and the motivation to novelties. In addition, the tunneling maintains the motivation to novelties. However, the motivation to novelties decreases the production of creative mindies.

During the year 14 the tunneling is the main variable and it maintains both the production of creative mindies and the motivation to novelties that maintains the production of creative mindies. Thus the production of creative mindies returns to the former state and maintains the motivation to novelties.

In transition from 14 to 15 years the tunneling begins to open because tolerance decreases dogmatism that maintains tolerance. The opening tunneling forms a feedback loop with the motivation to novelties and decreases the motivation to novelties. The decreasing motivation to novelties maintains the opening tunneling. The loop maintains the production of creative mindies through the decreasing motivation but increases the production of creative mindies through the opening tunneling. The maintenance further decreases motivation to novelties.

In the year 15 the tunneling opens because the

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the decreasing dogmatism depresses tolerance that depresses dogmatism further. The decreasing motivation to novelties further decreases the tunneling that decreases the motivation to novelties that forms a feedback loop with the creative mindies. The decreasing motivation to novelties maintains the production of creative mindies that maintains the decreasing motivation to novelties. The loop decreases further the tunneling through the decreasing motivation but maintains the decreasing tunneling through the production of creative mindies that maintain the decreasing motivation.

In transition from 15 to 16 years the opening of the tunneling continues because the decreasing dogmatism depresses tolerance further that maintains the decreasing dogmatism. The feedback loop is as before but changes take place in it. The decreasing motivation to novelties maintains the production of creative mindies that further decreases motivation to novelties. The loop decreases the tunneling further through the decreasing motivation to novelties but maintains the decreasing tunneling through the production of creative mindies.

In the age of 16 the decrease of the tunneling

stops. The feedback loop is between the same variables but the loop changes again. The decreasing motivation depresses the production of creative mindies that decreases the motivation to novelties further. The feedback loop decreases the tunneling further through the decreasing motivation to novelties but maintains the decreasing tunneling through the decrease of creative mindies. What kind of dynamism includes in the process?

The relationships of the process need terminological replacements because the events of dynamism come better in sight in that way. Putting equality signs between the terms (a) decrease and deviation strengthening (b) increase and restore to, and (c) maintain and stabilize makes it possible to follow up the dynamism.

In 13 years of age dogmatism and tolerance stabilize each other that implies the tunneling. The tunneling stabilizes both the motivation to novelties and the production of creative mindies. The motivation to novelties stabilizes the production of creative mindies that stabilizes the motivation to novelties.

In transition from 13 to 14 the stabilization of tunneling continues but the main variable is the

production of creative mindies that stabilizes both the tunneling and the motivation to novelties. The tunneling stabilizes the motivation to novelties. However, the motivation to novelties strengthens deviation of the production of creative mindies.

In the age of 14 the tunneling is the main variable and it stabilizes both the production of creative mindies and the motivation to novelties that stabilizes the production of creative mindies. The creative mindies restore to the former state and stabilize the motivation to novelties.

In movement from 14 to 15 years the tunneling begins to open because tolerance strengthens deviation of dogmatism that stabilizes tolerance. The opening tunneling forms a feedback loop with the motivation to novelties and strengthens deviation of the motivation to novelties. The strengthening deviation of the motivation to novelties stabilizes the opening tunneling. The feedback loop stabilizes the production of creative mindies through the strengthening deviation of the motivation to novelties but restores the production of creative mindies through the opening tunneling. The stabilization of the creative mindies strengthens deviation of the motivation to novelties.

In the age 15 the tunneling opens because the strengthening deviation of dogmatism from tolerance strengthens and tolerance strengthens the deviation of dogmatism. The strengthening deviation of the motivation to novelties strengthens the opening of tunneling that strengthens deviation of the motivation to novelties. The motivation to novelties forms a feedback loop with the creative mindies. The strengthening deviation of the motivation to novelties stabilizes the production of creative mindies that stabilizes the strengthening deviation of the motivation to novelties. The feedback loop strengthens the openness of the tunneling through the strengthening deviation of the motivation to novelties but stabilizes the openness of the tunneling through the production of creative mindies that stabilizes the strengthening deviation of the motivation to novelties.

In transition from 15 to 16 years the opening of the tunneling continues because the strengthening deviation of dogmatism strengthens deviation of tolerance that stabilizes the strengthening deviation of dogmatism. The feedback loop is as before but a change takes place in it. The strengthening deviation of the motivation to novelties stabilizes the production

of creative mindies that strengthens the strengthening deviation of the motivation to novelties. The feedback loop opens the tunneling through the strengthening deviation of the motivation to novelties but stabilizes the opening tunneling through the production of creative mindies.

In the age of 16 the opening of the tunneling stops. The feedback loop stays the same but it changes again. The strengthening deviation of the motivation to novelties strengthens deviation of the production of creative mindies that again strengthens deviation of the motivation to novelties. The feedback loop again opens the tunneling through the strengthening deviation of the motivation to novelties but stabilizes the opening tunneling through the strengthening deviation of the creative mindies.

The entire dynamism characterizes in various ways but the total direction is from stabilization to vacillation, from tight to loose, from the strong relationships to the weak relationships, from stable to labile. Theoretically, the matters become more complex because the study indicates some pitfalls in educational theory construction, which probably is the contribution the study gives.

The first surprise is the design of the study does not hold. The change of the dependent operator shows that a researcher in an educational research cannot be certain what the main operators are or what kind of groupings the operators form in dynamics. It means paying attention to the possible directions the operators can have. Naturally, the existence of noncausal dynamics cannot be excluded that purposes fluctuating dynamism where the functions of the operators change in time. In educational theory construction it is likely that the number of degrees of freedom in hypotheses is to be great because serendipity is connected with the study of educational objects. The above means an educational theory is good to include maximum number of possibilities of operators and concepts, although some of the possibilities realize. The advantage of a flexible theory is it includes potentiality that makes it probable to continue the construction in differing conditions.

Second, the initial conditions in dynamic educational theory construction have to be cleared up because otherwise the inner organization of a theory does not adapt to real conditions and situations. This

implies a theory for the sake of the theory and the normative aspect of an educational dynamic theory remains unfilled.

The third angle that the study shows, a dynamic educational theory construction is to take into account of contradictive effects which are quite usual in behavior for example A and—A does not hold, necessarily. A human being can be joy and sad, simultaneously. It is a relevant objective to attempt to construct consistent educational theories but controversies and inconsistencies include in human behavior. So why try to exclude them in theory construction?

To fulfill the normative aspect of education I describe the probable behavior that the study indicates and try to associate with it educational behavior which may be useful in real situations. Naturally, interaction between behavioral outcomes and educational behavior is not of general application but in the boundary conditions set by the study.

In 13 years of age the tunneling of mind is the pace maker for other operators and dynamic returns to constant. The phenotypical behavior probably is recurring in nature because of the stabilization. The same kind of behavior repeates from day to day.

Thus educational behavior transformation is to concentrate on tunneling that has to be decreased. One of the ways to diminish tunneling is to offer unconventional solutions to problems, to give three to four solutions, for example the weather report. An instructer can offer an as if-situation. Pupils are asked for to write three reports done by three humans in three different occupations, physicist, fortuneteller, and biologist.

In 13 to 14 years the production of creative mindies synchronizes dynamism and it oscillates somewhat. The totality of dynamism does not change drastically. It is likely that open behavior continues along the same trace as before. So offering new experiences and paying attention to productive behavior may promote the production of creative mindies. For example, the tasks of inventing new uses for tools such as a fork, what a human can do with fork, may increase new angles and give pondering. Experimenting with a fork is not out of question, too.

In 14 years old there is a recovery back to the initial situation. The manifest behavior does not include changes compared with earlier behavior. Thus for the sake of preservation of dynamism an instructer

can combine the methodical behaviors above. Essential is the solutions include new unexpected aspects.

In between 14 and 15 years the real problem is the eccentric loop between the motivation to novelties and the opening tunneling. The reason is, the loop stabilizes the creative mindies that increases oscillation in the motivation to novelties. The probable alternative of phenotypical behavior is transition into the position of an observer because of the fluctuating motivation. So it is reasonable to tackle motivation and try to damp its oscillation by offering experiences from new phenomena. The sciences are in a crucial position because they give possibilities for personal involvement of phenomena. For example, thermodynamic experiments imply homeostatic events in human body.

In 15 years of age the motivation to novelties continues to oscillate which the stabilization of creative mindies promotes. Thus the probable behavioral alternative is to withdraw from situations that demand new adaptive action. Thus the motivation to novelties needs special attention. Evidently, experiences of success are needed through tasks which are not too

difficult and produce pleasure. Thus the need is for practical exercises where pupils are got to involve in instructional situations. One of the ways is to put the pupils to list information they need for clearing from the examination and adapt the tasks accordingly.

From 15 to 16 years the eccentric loop is between the creative mindies and the motivation to novelties. The effects of the loop become a one way matter with the opening tunneling. The alternative is not far that getting disgusted with learning is salient feature of behavior. The fluctuating motivation to novelties further has a central position because it stabilizes the creative mindies as before. Thus small steps of success may be a proper mean to damp the fluctuation. It means giving up the strict instructional aspects and applying the subject matters to the performance level of the pupils. The increasing order of difficulty in the longer time span may be profitable. Rationing and organizing the quantity of information begins to play a role in this context. That is not learned in teacher education institutes where the human limitations in information intake, be it emotional or not, is not taken into account. The tasks at hand are to be shortened and the order of performing them

determined. For example in languages it is adequate to read words in groups of 3-5 keeping intervals. In the same way it is relevant to read the paragraph under study through cursorily but to translate the whole sentences.

In 16 years of age the entire dynamic of the operators oscillates, except the stabilization of the open tunneling from oscillating creative mindies. Evidently, the salient alternative of open behavior is indecision from differing goals for example changing the occupational choices every little while. Rationing and organizing of information emphasizes more because small stimuli do not overload the information processing and through it the labile state is avoided. The usual error when young persons are in an unstable condition is to overload and try to teach the entity of a subject matter at a time. That is why it is essential to acquire a complexioned of rationing and organizing in reality because it is one of those matters that is not adopted in theory. The rationing is to be grafted into dynamic educational theory construction that lacks of it. For example, the organizing of a calculation in clear phases is more efficient than producing mathematical coils, sequentially. Of course, planning of lessons is

relevant but when a teacher is in real situations then there emerge surprises such as spontaneous disturbances but the teacher has take care of the confronting situations. In unexpected situations the planning of lessons has not much of use and the rigid involvement into a certain instructional model taught in the teacher education institutes becomes a burden. Thus the growth of young persons includes surprises and managing with the surprises is one the aims of education, not the strict modeling which tries to subordinate reality. Furthermore, the growth of such information wherefrom other information can be deduced is not so rapid as it is made persons believe. Thus instruction of information axioms is not a bad aim in teacher education because it makes educational behavior more economic, less hasty, and gives certainty of choices in didactical situations; the qualities which arouse trust in young persons.

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